

Claim rejections under 35 U.S.C. § 102

Claims 1, 7-9 and 12 are rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by *Steinman* (U.S. Patent No. 5,397,710; hereinafter “*Steinman*”).

Specifically, the rejection states that “*Steinman* teaches an indicator solution having a dihydroxy complexometric dye, a masking agent, a stabilizer, an alkaline buffer and a chelating agent and a method for making the indicator solution.” The rejection refers to col. 4, lines 27-51 and col. 6, line 60 through col. 7, line 56 in *Steinman* for the examples of “azo dyes” and “complexing/masking agents and several buffers,” respectively. Furthermore, it states that Examples 1-3 of *Steinman* show several compositions which anticipate the above claims.

Applicant respectfully traverses the rejection.

The rejection is based on the mere semantic commonality between the composition of the present invention and that of *Steinman* and ignores the definition of each term and the function of each component in respective inventions by taking the common terms out of the contexts.

The present invention provides a stable aqueous azo-dye solution for ***determining the residual content of chlorine dioxide*** in water, in particular, drinking water, accurately and selectively, *i.e.*, even in the presence of other oxidizing agents and chloro-compounds, such as chlorides, chlorites and chlorates. The aqueous solution of the present invention comprises an azo dye, a borate buffer and one or more masking agents, wherein the azo dye changes its coloration or coloration intensity ***in the presence of chlorine dioxide*** and is stable at room temperature for at least one month in a closed bottle (page 7, lines 17-18 of the specification). Thus, claim 1, from which all claims 7-10 and 12 are dependent, recites:

1. An aqueous solution comprising an azo dye, a borate buffer and one or

more masking agents, *wherein the azo dye changes its coloration or coloration intensity in the presence of chlorine dioxide*. (emphasis added).

In *Markman v. Westview Instruments, Inc.*, “Claims must be read in view of the specification, of which they are a part. *Autogiro*, 384 F.2d at 397, 155 USPQ at 702; see *Winans v. Denmead*, 56 U.S. (15 How.) at 338; *Bates v. Coe*, 98 U.S. at 38-39. The specification contains a written description of the invention that must enable one of ordinary skill in the art to make and use the invention. For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. . . .”¹ Further, “Words defined in the specification should be given the same meaning in the claims.”²

Accordingly, each element recited in the claims of the present application must be given the construction described in the present specification. In the present invention, an azo dye recited in claim 1 changes its coloration or coloration intensity *in response to the presence of chlorine dioxide* in a water sample, without being affected by the presence of other oxidizing agents or chloro-compounds. The best examples of such azo-dye are amaranth and Evans blue (see page 5, lines 12-15 of the specification). The “masking agent” recited in claim 1 refers to any compound capable of reacting with *free chlorine* so that the effect by the latter on the coloration or coloration intensity change of the azo dye can be avoided. The examples of such masking agents are *glycine, cyclamate of alkali metal or*

¹ 52 F.3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995) (in banc), *aff'd*, 517 U.S. 370, 38 USPQ2d 1461 (1996).

² *McGill, Inc. v. John Zink, Co.*, 736 F.2d 666, 221 USPQ 944 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 1037 (1984).

alkaline earth metal, and aqueous ammonia, and preferably aqueous ammonia (see page 6, lines 1-5 of the specification). The presence of the masking agent(s) enables the coloration or coloration intensity changes of the azo dye to be specific for chlorine dioxide.

On the other hand, *Steinman* discloses a process and a composition for measuring the **magnesium concentration** of a biological fluid based on color change in a dry chemistry strip containing a dihydroxy complexometric dye, a masking agent, a chelating agent and a dryable stabilizer in an alkaline buffer dried onto the strip (col. 3, line 28 through col. 4, line 20). *Steinman* speculates that boron of borate buffer may form cyclic complexes with these particular types of azo dye, *i.e.*, dihydroxy complexometric dyes, and stabilizes the dyes until they chelate with magnesium (col. 5, lines 22-45). Thus, the composition of *Steinman* has **nothing to do with measuring chlorine dioxide in a water sample**. The azo dye required in *Steinman*'s composition is a dihydroxy complexometric dye, which changes its color upon its chelation of metal cations, in particular, **magnesium ion** present in a biological sample. There is **no description** in *Steinman* that the color changes of the dihydroxy complexometric dye is due to the presence of chlorine dioxide as recited in claim 1 of the present application. Moreover, there is no description whatsoever with regard to the use of *Steinman*'s composition for measuring a chlorine dioxide concentration in a water sample.

Furthermore, the “masking agent” referred to in *Steinman* has nothing to do with the “masking agent” recited in claim 1 of the present application which “masks” the **presence of reactive chlorine compounds**. The “masking agent” of *Steinman* rather masks **the presence of calcium and other heavy metals such as iron** so that the dihydroxy complexometric dye can react with magnesium selectively. As examples of the masking agent, *Steinman* lists cheaters, such as EGTA, cyanide ion and triethanolamine. Thus, the

nature and function of the respective “masking agents” are totally distinct between the present application and *Steinman* in relation to their effects on the respective azo dyes.

Thus, claims 1, 7-10 and 12 are totally distinct from the composition disclosed in *Steinman* and, therefore, none of these claims are anticipated by *Steinman*. Accordingly, Applicant respectfully requests that the claim rejections under 35 U.S.C. § 102(b) as being anticipated by *Steinman* be withdrawn.

Claim rejections under 35 U.S.C. § 103

Claims 1-10 and 12-20 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over *Hofmann et al.* (1998, *Environmental Technology* 19:761-773; hereinafter “*Hofmann*”) or *Knechtel* (1978, *Analytical Chemistry* 50(2):202-205; hereinafter “*Knechtel*”) in view of *Hutchings* (U.S. Patent No. 4,880,556; hereinafter “*Hutchings*”).

Applicant respectfully traverses the rejection.

Hofmann compares methods for measuring chlorine dioxide in 0.1 mg/L to 2 mg/L range, using three different spectrophotometric reagents: (i) acid chrome violet (ACVK); (ii) Lissamine Green B (LGB); and (iii) amaranth. However, as the Examiner acknowledges (page 3, line 12 of the Office Action), *Hofmann* does not teach the use of a borate buffer in connection with the use of amaranth. Furthermore, there is no teaching or suggestion to use any metal-chelating agent together with amaranth. In fact, with regard to the effects by the presence of metals, *Hofmann* only discloses the effects of permanganate on measurement errors in terms of its pink tint, which has absorbance in the 450 to 600 nm range, as well as its amaranth-oxidizing activity and simply suggests that the *amaranth method should be avoided* when permanganate is present in water sample (page 770, ¶¶1 and 2). Thus, *Hofmann* actually teaches away from the use of amaranth for determining a

chlorine dioxide concentration.

Knechetel teaches a spectrophotometric method for determining chlorine dioxide in sewage treatment plant effluents based on the decrease in absorbance at 550 nm of acid chrome violet K (ACVK) in a NH₄Cl-NH₃ buffer of pH 8.1 to 8.4. As the Examiner acknowledges (page 3, line 24 of the Office Action), *Knechetel* does not teach the use of a borate buffer either.

With regard to a borate buffer element, the Examiner points to *Hutchings* which discloses an aqueous ***cleaner compositions*** containing an alkali metal halogenite, for example, NaClO₂; a stabilizable colorant; and a stabilizing amount of a stabilizer compound, such as borates. The rejection states as follows:

In the background *Hutchings* teaches that conversion of an alkali metal halogenite such as sodium chlorite into chlorine dioxide is known to occur at a pH of less than 9.0. When this happens coloring agents used in the cleansers [sic] fade creating problems associated with the lack of color. column 4 lines 1-12 teach several dyes including azo-dyes that are known to be affected by this. The examples show several situations in which the production of chlorine dioxide is prevented by the use of a borate buffer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the borate buffer *Hutchings* into the *Hofmann* or *Knechetel* reagent and method because of its known ability to stop the conversion of a compound such as sodium chlorite into chlorine dioxide which would have been expected to give incorrect results.

Applicant respectfully disagrees with the statement above.

Firstly, *Hutchings* discloses a ***cleaner compositions***, for use in household and janitorial cleaning chores, for example, cleaning of tiles, porcelain surfaces, and drains, which has nothing to do with a composition or method for determining a chlorine dioxide concentration in a water sample. There is no motivation for one of ordinary skill in the art to look to *Hutchings* for useful information for developing a composition and method for

determining a chlorine dioxide concentration, let alone, to combine *Hutchings* with *Hofmann* or *Knechtel*.

Secondly, in *Hutchings*, the colorant is added to the cleaner composition to provide a “pleasing hue to the consumer, and makes the composition visible when applied to the work surface being cleaned” (col. 1, lines 40-44). The colorants in *Hutchings* have totally different function and purpose from the azo dyes of the present invention. Although, in some instances, the colorant of *Hutchings* is an indicator that the product composition has been exhausted as a result of the bleaching effect by chlorine dioxide, such an indication is totally incidental and ***in no way teaches a method or composition for determining a chlorine dioxide concentration in a water sample.*** In *Hutchings*, the use of colorants which are unstable or incompatible with alkali metal halogenite solutions will result in the production of chlorine dioxide, which has unpleasant odor for the users and causes the loss of tinctorial value of the colorant, lowering of composition pH, and the loss of the alkali metal halogenite. Thus, *Hutchings* provides the cleaner compositions which contain alkali metal halogenite, a stabilizable colorant and a stabilizer selected from the group consisting of the alkali metal, preferably sodium and potassium, salts of carbonates, borates, and mixtures thereof, at pH of about 9 and above, preferably from about 9.0 to about 10.5 (col. 2, lines 10-21; col. 2, lines 46-50; and ABSTRACT).

In other words, *Hutchings* uses borates, among other stabilizers, to stabilize the colorant and the composition itself, a combination of which is otherwise unstable, so as to ***avoid the production of chlorine dioxide.*** Accordingly, even if, *arguendo*, one of ordinary skill in the art decided to look to *Hutchings*, he would ***not*** directly “incorporate borate buffer of *Hutchings* into the *Hofmann* or *Knechtel* reagent and method” as the rejection states in order to stabilize the composition of *Hofmann* or *Knechtel* which tries to measure chlorine

dioxide.

Thus, none of these references teaches, suggests, or motivates one of ordinary skill in the art to combine them to come up with the aqueous solution of the present invention recited in the claims.

Accordingly, Applicant respectfully requests that the claim rejections under 35 U.S.C. § 103(a) as being unpatentable over *Hofmann* or *Knechtel* in view of *Hutchings* be withdrawn.

Applicant believes that claims 1-20 are now in condition for allowance, early notification of which is earnestly requested.

No fee other than the extension fee is believed to be due for this submission. Should any fee be required, please charge it to the Deposit Account 16-1150.

Respectfully submitted,

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